

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Appl. No. : 10/699,948  
Applicant : John W. Bucknell  
Filed : February 28, 2000  
Patent No. : 7,140,824  
Issue Date : November 28, 2006  
Title : TENSIONING HYDRAULIC NUTS

Conf. No. : 4335  
TC/A.U. : 3677  
Examiner : Jeffrey Andrew Sharp

Customer No. : 00116  
Docket No. : 38809

**CERTIFICATE OF CORRECTION TRANSMITTAL LETTER**

Mail Stop Certificate of Correction Branch  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Re: U.S. Patent No.: 7,140,824  
Issued: November 28, 2006  
Inventor: John W. Bucknell  
Our Docket No.: 38809

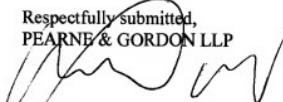
Sir:

A Certificate of Correction under 35 U.S.C. 254 is hereby requested to correct Patent Office printing errors in the above-identified patent. Enclosed herewith is a proposed Certificate of Correction (Form No. PTO-1050) for consideration. Also enclosed is documentation in support of this request.

It is requested that the Certificate of Correction be completed and mailed at an early date to the undersigned attorney of record. The proposed corrections are obvious ones and do not in any way change the sense of the application.

We understand that a check is not required since the errors were on the part of the Patent and Trademark Office in printing the patent.

Respectfully submitted,  
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UNITED STATES PATENT AND TRADEMARK OFFICE  
CERTIFICATE OF CORRECTION

PATENT NO. : 7,140,824

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APPLICATION NO.: 10/699,948

ISSUE DATE : November 28, 2006

INVENTOR(S) : John Wentworth Bucknell

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

- In column 8, Line 7, please delete --100-- and insert --10°--.
- In column 10, Line 63, please delete --the nut and article-- and insert --the cone nut body and article--.
- In column 10, Line 64, please delete --said-- and insert --the--.
- In column 10, Line 66, please delete --angled-- and insert --angle--.

## MAILING ADDRESS OF SENDER (Please do not use customer number below):

Jeffrey J. Sopko, Pearne &amp; Gordon, 1801 E. 9th Street Suite 1200, Cleveland OH 44114-3108

This collection of information is required by 37 CFR 1.322, 1.323, and 1.324. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1.0 hour to complete, including gathering, completing and reviewing the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Attention Certificate of Corrections Branch, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
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9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

The hydraulic tensioning systems 225, 325, 425 correspond to the hydraulic tension system 225 of FIG. 4 and operate in like manner.

The inventor has examined various threaded connections for the tensioner/studbolt interface, and found that the simplest configuration having the best stress distribution is a  $10^\circ$  tapered buttress thread modelled on the standard API cone thread. Tapered cone styles with  $60^\circ$  threads have been around as connectors for tensile rods such as drill steels since the industrial revolution - downhole hammers used in drilling have a modified tapered buttress thread form, as do components of rock crushing equipment. The specific benefits of using this type of thread are resistance to loosening, quick breakout and the use of thin walled elements as the threadform does not generate significant radial thrust forces. The inventor has chosen to use a modified buttress with a slight overpitch (increased thread pitch) (eg., 3.005mm) on the puller (relative to 3.00mm on the studbolt) which gives a near-perfect load distribution on the threads. The shoulders of the buttress-form threads are essentially perpendicular to the pullers and bolts common axis, and therefore have no radial thrust.

The inventor has designed a specific threadform for this application, as shown in FIG. 30. It has a very low face angle (eg.,  $2.5^\circ$ ) and exaggerated root radii (eg., 0.2-0.25mm) to prevent stress concentrations common with generic forms. The more even stress concentration patterns in the components are illustrated by the stress concentration pattern shown in FIG. 31.

The cone nut assembly 20 can be specifically designed using computer modelling to obtain the best possible component shape to:

1. retain the highest proportion of load provided by the hydraulic mechanism when transferring that load to the nut assembly;
2. provide even loading at the threaded interface rather than the concentration of load found with standard nut/bolt connections.

This is preferably achieved by modelling the components' deflections during the complete operational cycle of the tensioner to determine the precise set of dimensions "pre-tensioning" which will give the ideal deflected shape "post tensioning".

- 30 Obviously, the shape of various sections of components will alter during cycle, and the

an hydraulic means acting between the puller bar and the article via a bridge positioned around and over said cone nut and against the puller bar to pull the puller bar and puller buddy in a direction away from the article to tension the studbolt;:

wherein, said bridge stands directly upon said outer annular collar in operation.

17. (Currently amended) A cone nut assembly ~~for use within~~ <sup>?</sup> as hydraulic tensioner for applying tension to a studbolt extending from an article, wherein the tensioner includes a puller bar for connection with an end of the studbolt, and an hydraulic means acting via a bridge between the puller bar and article to exert a pulling force on the studbolt in a direction away from the article, said cone nut assembly comprising:

a cone nut body having an axial length and with a substantially conical or tapered peripheral outer surface along a substantial portion of said axial length;

an outer annular collar radially surrounding said nut body and having ~~with~~ a complementary conical or tapered recess to receive the cone nut body, in use;

the cone nut body being screwed, in use, on said studbolt and into the recess of the outer annular collar, and adapted to be adjusted along said studbolt and against said collar to take up elongation of the studbolt as a result of applying tension to it;:

wherein, said bridge stands directly upon said outer annular collar in operation.

18. (Currently amended) A washer for use between the cone nut body and article in the tensioner as claimed in claim 17, the washer comprising:

first and second annular means mating at a slip plane angle from a plane transverse to the axis of the washer; and

removable or releasable means holding the first and second annular means against relative slip over the slip plane therebetween while the removable or releasable means is in place.

37. (Currently amended) A hydraulic tensioner as claimed in claim 1, wherein: the bridge is engaged between the hydraulic means and the outer annular collar.

The following is an examiner's reason for allowance with comment:

The amendment clarifies the structure of the "nut body" and "collar or shell", so that they do not read on conventional self-leveling/self-centering nut-washer assemblies common in the art. A "collar or shell" may be broadly construed as a washer, unless the new "radially surrounding...etc." limitation is added.

The prior art suggests a puller bar having right angle "butress threads" and a "nut body" for threaded engagement on a studbolt having a downwardly and inwardly substantially conical or tapered peripheral outer surface, and an annular collar or shell with a complimentary conical or tapered recess to receive the nut body in use". This is evidenced by U.S. Pat. No. 4,773,146 to Bunyan. Bunyan clearly shows butress threads (40,42) on a puller bar (21) to sustain high tensile loads, and a nut (14) and annular collar or shell (15) having the mating tapered interconnection disclosed.